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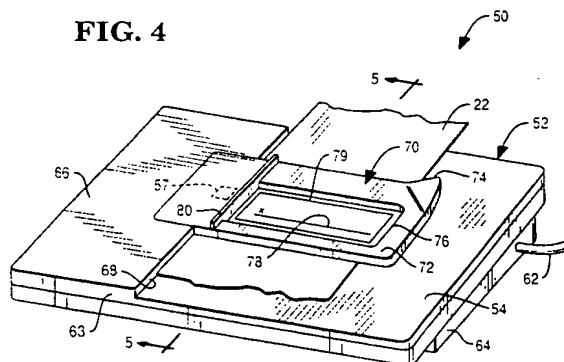
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⑤④ **Handwriting capture device and method.**

⑤⑦ A handwriting capture device (10,50) which employs a highly sensitive digitizer (18) to accurately capture signature information entered using a writing force greater than or equal to a predetermined writing force includes a housing (12,52) having a top surface (16,54), a resistive membrane digitizer mounted in the top surface and having a low pattern density, circuitry for processing digitizer information, a clamp (30,70) for retaining a receipt (22) in place over the digitizer during movement of the device, and circuitry (24,56) for sensing the presence of the receipt (22) and for activating data capture by the digitizer (18) when the receipt is positioned under the clamp (30,70). In one embodiment, the clamp (70) is provided with an extending rib (80) to minimize finger contact with the digitizer (18).

FIG. 4



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This invention relates to handwriting capture devices of the kind including a housing having a top surface; digitizing means; and processing means coupled to said digitizing means.

In retailing and similar areas, the volume of transactions is often such that management of paper records is becoming increasingly burdensome. This problem in the use of paper records is particularly noted in terms of storage of paper documents, retrieval of prior paper records which are needed at a later time, and use of the paper documents in authorizing and/or validating the transfer of funds. If the transfer of funds is disputed, the party responsible for maintaining the paper documents may be held liable for the amount of payment represented by the paper document in the event that such document cannot be located. A failure in ability to retrieve documents in a rapid, efficient manner may thus be costly to a merchant and/or a financial institution. In addition, the effort and facilities required to store paper documents for possible retrieval are costly. Furthermore, the delay which may be involved in processing paper documents through such a system in the event of a dispute may be costly and negative in terms of customer relations.

Another source of delay in the current processing of transactions at the point of sale is the time required for processing credit card transactions, including such time-consuming operations as inserting a customer card in an embossing device, performing the embossing operation, filling out the credit receipt blanks and obtaining a customer signature thereon.

The document US-A-4 679 241 discloses a portable autographic register including a position measuring writing pad and a filing compartment for housing a pack of interleaved continuous autographic register business form webs. The webs are fed from the filing compartment to the writing pad by feed means which includes a pair of feed pins which engage a pair of apertures adjacent to the leading edge. Operation of a lever serves to pull the webs through the register a sufficient distance so that the leading part of the leading form length of the web projects through an aperture a sufficient distance so that the leading part may be gripped by the operator and the web pulled through the register manually. With the web correctly positioned, the operator writes on the business form, the writing being sensed by the writing pad to provide electrical signals which are processed to recognize the written characters and operate a visual display of the recognized characters.

It is an object of the present invention to provide a handwriting capture device of the kind specified which is of simple and inexpensive construction and which enables a signature written on an externally provided document to be captured.

Therefore, according to one aspect of the present invention, there is provided a handwriting capture de-

vice, including a housing having a top surface; digitizing means; and processing means coupled to said digitizing means, characterized in that said digitizing means is mounted within said top surface and in that retaining means are provided, located on said top surface externally of said housing, and adapted to hold a record member in a predetermined position on said top surface.

It will be appreciated that a handwriting capture device according to the present invention has the advantage that a customer signature on an externally provided receipt or other document can be accurately captured electronically thereby eliminating the need for the maintenance of a paper record thereof by the merchandise or other service provided, while providing the customer with a conventionally signed receipt or other document.

According to another aspect of the present invention, there is provided a method for capturing handwriting, characterized by the steps of providing a housing having a top surface with a digitizing means mounted therein; providing retaining means adapted to hold a record member provided externally to said housing in a predetermined position on said digitizing means; effecting writing to said digitizing means through said record member; and processing a signal representing the writing from said digitizing means.

Two embodiments of the present invention will now be described by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a first embodiment of the handwriting capture device of the present invention;

Fig. 2 is a sectional view of the handwriting capture device taken along line 2-2 of Fig. 1;

Fig. 3 is a sectional view of the handwriting capture device of the present invention taken along lines 3-3 of Fig. 1;

Fig. 4 is a perspective view of a second embodiment of the handwriting capture device of the present invention; and

Fig. 5 is a sectional view of the handwriting capture device of the present invention taken along line 5-5 of Fig. 4.

Turning now to Figs. 1 and 2, a first embodiment of the handwriting capture device 10 of the present invention is shown. The handwriting capture device 10 includes a housing 12 having a bottom supporting surface 14 and a top surface 16. In this embodiment, the housing 12 is generally rectangular in shape. The handwriting capture device 10 is lightweight and portable. The left end of the housing 12 is sufficient in width and depth to facilitate grasping of the housing 12.

Within the top surface 16 is a pressure-sensitive digitizer 18, although other types of digitizers are also envisioned. The digitizer 18 is sensitive to signing forces greater than or equal to a predetermined mini-

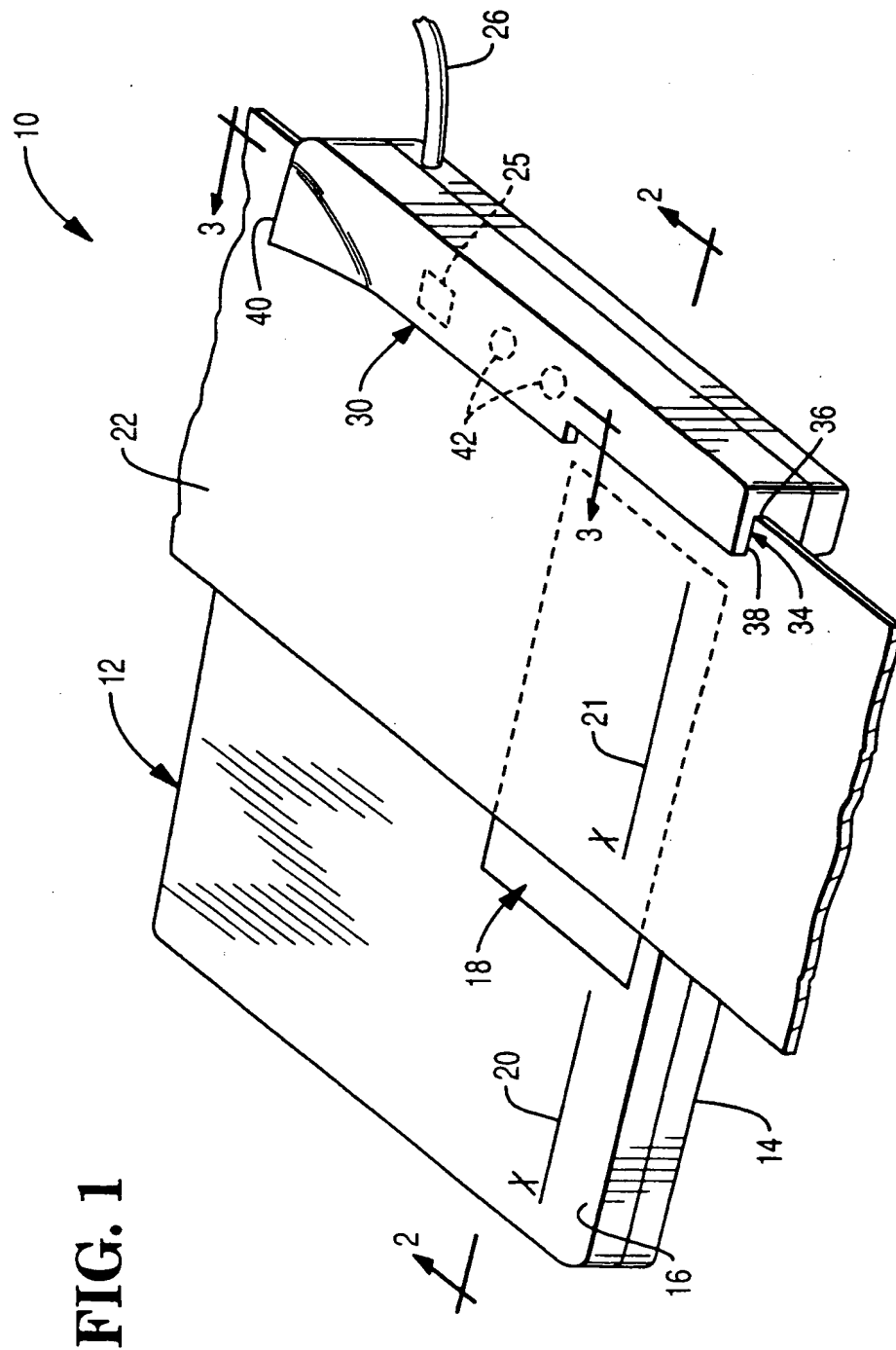


FIG. 1

FIG. 2

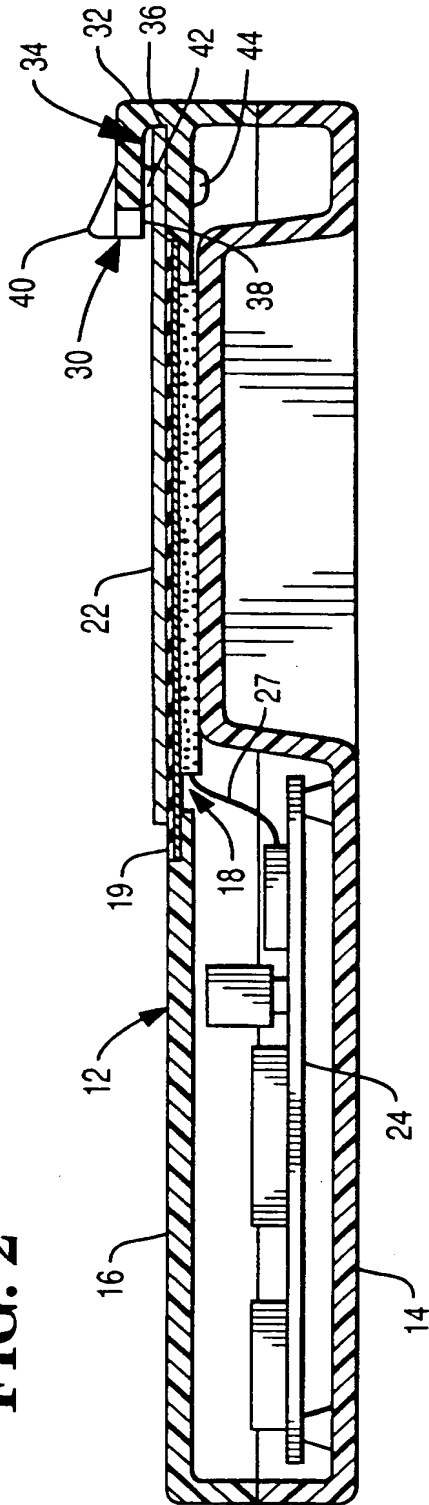
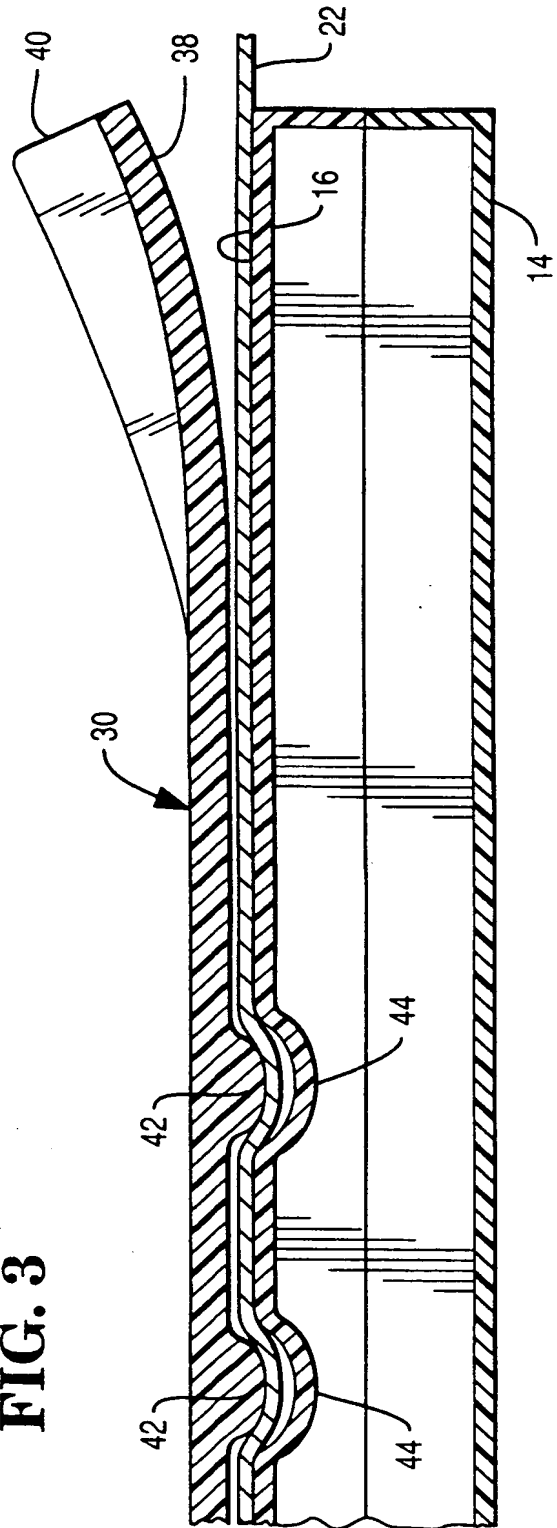


FIG. 3



imum signing force, which is no more than about 10 to 15 grams. When a pen is used, the digitizer has a sensitivity sufficient to capture a handwriting that produces a legible ink impression on the receipt. In this embodiment, a digitizer manufactured by W.H. Brady & Co. and having a part number 2500044089 is used. This digitizer has a near separation between dots of 5.1mm (0.2 inches). Dot separations higher than 5.1mm (0.2 inches) are not recommended because spurious digitizer readings are more likely to occur. Digitizers having dot separations as low as 4.1mm (0.16 inches) may be used in the present invention to achieve valid handwriting capture. The sensitivity of a pressure-sensitive digitizer is determined by the density of the spacer dot pattern, which maintains separation between the top and bottom sheets of the digitizer. The more dense the pattern is, the more resistant the digitizer is to undesired actuation by an operator's finger. However, a high pattern density requires more writing force to capture a signature. Since the device 10 does not have a display or other other source of immediate feedback, the digitizer 8 should be sensitive to writing force.

A thin layer of urethane rubber 19 is affixed to the top surface of the digitizer 18. The urethane rubber 19 provides a high friction surface for keeping the receipt 22 in place. A signature line 20 on the upper surface 16 and to the left of the digitizer acts as a guide for lining up a receipt 22 having a signature line 21.

Also within the housing 12 is the electronic processing circuitry 24 for operating the digitizer 18 and for controlling information flow from the digitizer 18 to a point-of-service (POS) terminal (not shown). The digitizer 18 is coupled to the electronic circuitry 24 by a wire connector 27 and the electronic circuitry 24 is coupled to the POS terminal by a wire cable 26. The housing may also include circuitry 25 for sensing the presence of the receipt 22 and activating the digitizer 18. In this embodiment, circuitry 25 includes a commercially available optical switch having an emitting side and a receiving side, both on opposite sides of the receipt. The sensing circuit 25 activates data capture by the digitizer 18 when the receipt 22 is in position under a clamp 30 so as to minimize acceptance of false actuations.

The paper receipt 22 from the POS terminal is properly aligned and held in place during movement of the device 10 by the clamp 30 which is integrally located on the top surface 16 at the right end of the housing 12. The clamp 30 includes an inverted, generally L-shaped member 32 having an inner surface 34. A vertical portion 36 of the inner surface 34 provides a stop against which the receipt 22 is aligned. A horizontal portion 38 of the inner surface 34 holds the receipt 22 in contact with the top surface 16 of the housing 12. The distance from the horizontal surface 38 to the top surface 16 is sufficient to allow a receipt 22 to pass between the two surfaces. The clamp 30

also includes an upwardly flared portion 40 at one end to facilitate insertion of the receipt 22 into the clamp 30.

Referring now to Fig. 3, the horizontal portion 38 of the inner surface 34 includes downwardly facing protrusions 42 which are generally hemispherical in shape in order to fixedly retain the receipt 22 in place. Correspondingly shaped receptacles or dimples 44 are located in the top surface 16 below the protrusions 42. In combination, the dimples 44 and protrusions 42 act to increase the frictional force between the top surface 16 and the receipt 22, thereby effectively retarding movement of the receipt 22 out of the clamp 30.

In operation, a POS operator inserts the right edge of the receipt into the clamp 30, starting at the upwardly flared portion 40. The receipt 22 is further inserted until the signature line 21 is properly aligned with the signature line 20 on the top surface 16 of the housing 12. In this position, the receipt 22 will also be properly aligned with the vertical surface 36 of the clamp 30 and properly engaged between the dimples 44 and the protrusions 42. The sensing circuitry 25 activates data capture by the digitizer 18. A customer then signs his name with a writing device, such as a pen, on the signature line 21. Advantageously, the handwriting capture device 10 is lightweight and can be easily transferred from person to person without dropping the receipt 22.

Referring now to Figs. 4 and 5, a second and preferred embodiment 50 of the handwriting capture device of the present invention is shown. Like the first embodiment, the preferred embodiment 50 includes a housing 52 having a top surface 54, electronic processing circuitry 56 within the housing 52, sensing circuitry 57 within the clamp 30, and a digitizer 18 within the top surface 54. The same considerations as in the first embodiment regarding digitizer choices apply in this embodiment. A thin layer of urethane rubber 19 is affixed to the top surface of the digitizer 18 to provide a high friction surface for keeping the receipt 22 in place. The electronic processing circuitry 56 is coupled to the digitizer 18 through a wire connector 60 and to a POS terminal (not shown) through a wire cable 62.

In addition, the housing 52 includes a top member 63 and a base member 64 which is inclined to facilitate writing. In order to properly align a receipt 22 for signature, the housing 52 includes a guide member 66 on the top surface 54 at one end of the housing 52. The guide member 66 has a vertical guide surface 68 against which the receipt 22 is aligned. The housing 52 is sufficient in width and depth to facilitate grasping of the housing 52.

The preferred embodiment also includes a clamp 70 for retaining the receipt 22 in place during movement of the device 50. The clamp 70 includes a frame member 72 which is generally rectangular in shape and which is made of transparent plastic to allow a

customer to view the itemized information on the receipt 22 while signing. The clamp 70 is anchored at its left end and its right end is biased against the top surface 54 of the housing 52. Centrally located within the clamp 70 is a rectangular window 76 exposing the digitizer 18 below. The window 76 facilitates proper installation of the receipt 22 over the digitizer 18 and serves to quickly orient a customer with the correct location 78 for signing. The clamp 70 may also include an upwardly flared portion 74 for facilitating insertion of the receipt 22 under the clamp.

Advantageously, the clamp 70 also serves to minimize finger contact with the digitizer 18. The clamp 70 includes a vertical rib 80 extending across the clamp 70 for guarding the digitizer 18 from the thumb of the left hand of a customer writing with his right hand and also restricts access to the digitizer 18 by a customer writing with his left hand. The frame member 72 blocks contact with the digitizer 18 by the right hand. In addition, the window 76 provides insufficient room for finger placement, forcing finger placement on the pen to be a predetermined distance upwards from the pen tip for both right and left-handed customers.

In operation, a POS operator holds the device 50 in one hand and inserts the receipt using the other hand by slipping the receipt 22 under the upwardly flared portion 74 until the receipt 22 rests against the vertical guide surface 68 and the signature line 78 or box 79 is within the window 76. A customer then signs his name with a writing device, such as a pen, on the signature line 78. Advantageously, the clamp design facilitates one-handed insertion of the receipt 22. Also, the handwriting capture device 50 is lightweight and can be easily transferred from person to person without dropping the receipt 22.

Claims

1. A handwriting capture device, including a housing (12,52) having a top surface (16,54); digitizing means (18); and processing means (24,56) coupled to said digitizing means (18), characterized in that said digitizing means (18) is mounted within said top surface (16,54) and in that retaining means (30,70) are provided, located on said top surface (16,54) externally of said housing (12,52), and adapted to hold a record member (22) in a predetermined position on said top surface (16,54).

A handwriting capture device according to claim 1, characterized by sensing means (25,57) adapted to sense the presence of a record member (22) held by said retaining means (19,30,37) and thereby actuate data capture by said digitizing means (18) when said record member (22) is held by said retaining means (30,70).

3. A handwriting capture device according to claim 1 or claim 2, characterized in that said retaining

means includes clamping means (30,70) disposed over said top surface (16,54) and a layer of high friction material (19) disposed over said digitizing means (18).

4. A handwriting capture device according to claim 3, characterized in that said clamping means (30) includes a generally L-shaped member (32) mounted on said top surface (16) having an inner surface (34) bearing a protrusion (42) adapted to cooperate with a receptacle (44) disposed in said top surface (16).

5. A handwriting capture device according to claim 3, characterized in that said clamping means (70) includes a frame member (72) biased towards said top surface (16) and provided with an aperture (76) over said digitizing means.

6. A handwriting capture device according to any one of the preceding claims, characterized in that said digitizing means is a pressure-sensitive digitizer (18) sensitive to a force greater than or equal to a predetermined minimum force from a writing instrument applied to said record member (22) over said digitizer (18).

7. A handwriting capture device according to any one of the preceding claims, characterized in that said top surface is provided with a guide surface (36,68) for aligning an edge of said record member (22).

8. A method for capturing handwriting, characterized by the steps of providing a housing (12,52) having a top surface (16,54) with a digitizing means (18) mounted therein; providing retaining means (30,70) adapted to hold a record member (22) provided externally to said housing (12,52) in a predetermined position on said digitizing means (18); effecting writing to said digitizing means (18) through said record member (22); and processing a signal representing the writing from said digitizing means (18).

9. A method according to claim 8, characterized by the steps of sensing the presence of a record member (22) on said digitizing means (18); and activating data capture by said digitizing means (18) in response to sensing of said record member (22).

FIG. 4

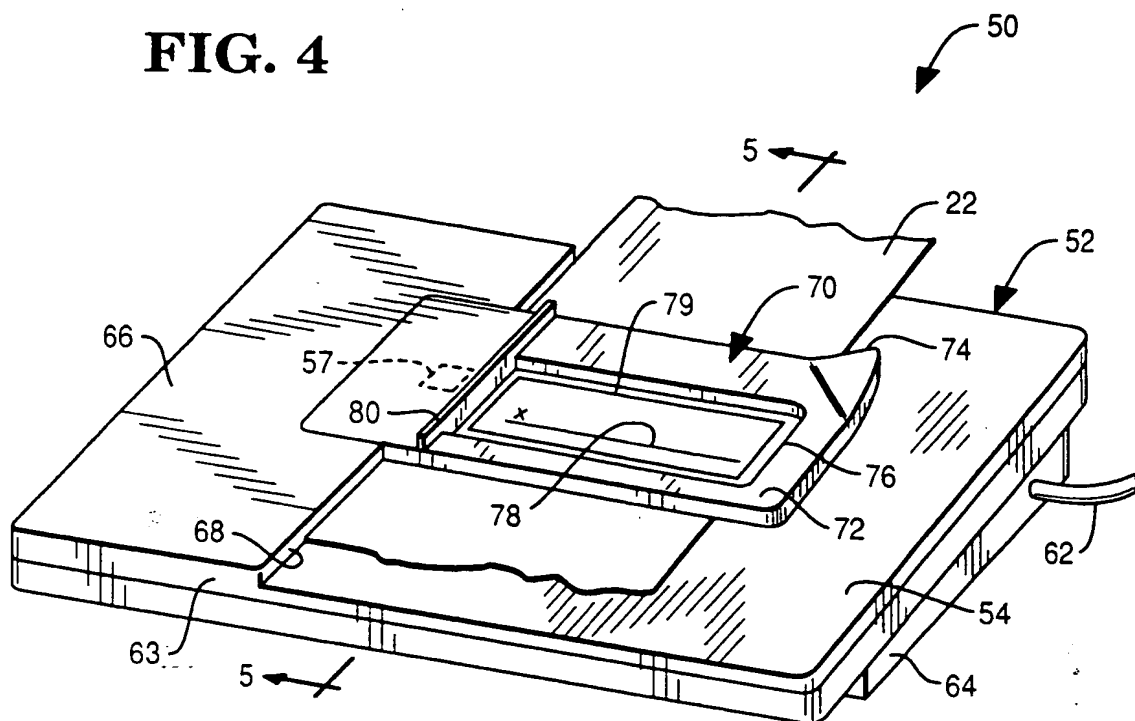
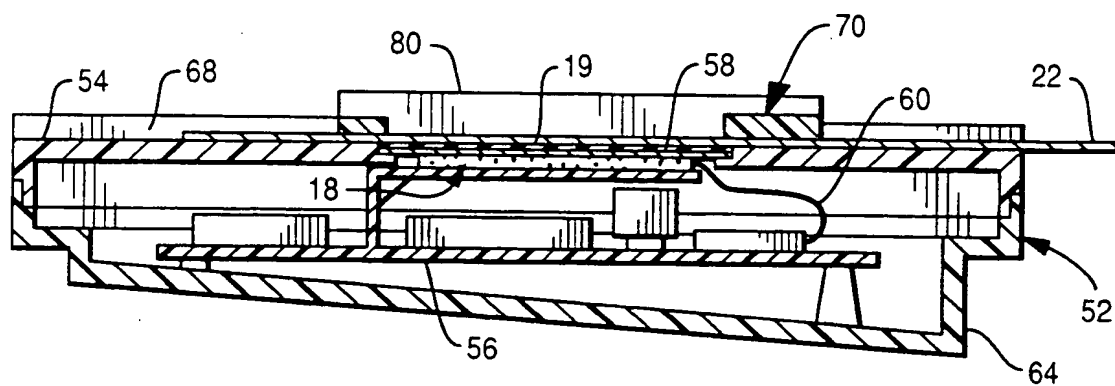


FIG. 5



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